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No. 129

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CHINA REPORT

SCIENCE AND TECHNOLOGY

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NATIONAL DEVELOPMENTS

RECENT DEVELOPMENTS IN PRC COMPUTER INDUSTRY OUTLINED

Beijing Computer Exhibition

Beijing GUANGMING RIBAO in Chinese 2 Sep 81 p 1

[Article by Zou Anshou [6760 1344 1108]: "Our Nation's Computer Industry Realizes New Progress"]

[Text] This reporter learned from the domestically manufactured computer products exhibition which opened yesterday in Beijing that our nation's new computer industry has made new progress. In recent years, the quality of products, the systematization and software and technical services have all visibly improved, the ratio between performance and price has improved, and computer applications have also produced preliminary results.

Our nation developed her first computer in 1958. Over the past 23 years, the efforts have developed into a fledgeling industry which includes scientific research and design, production and manufacturing and applications services. The whole nation has over 100 development and manufacturing units. In recent years, various models of series of machines have continued to develop. Greater improvements have been made in the stability of the products, systematization and producing sets of equipment, the ratio of performance to price and technical services. For example, the average operating time without downtime of the DJS130 small mainframe computer, which is the one widely used nationwide, has been increased from 50 hours in the past to over 1,000 hours. The systems capacity has increased from the past "three old components" (photoelectric input, punch card output, teletypewriter) as peripheral equipment to over 20 types at present. The systems software is gradually being perfected, the costs and prices have also dropped by a large scale. To strengthen technical service, last year, the nation established the China Computer Technical Service Company and the Series Computers Software Center. This year, branch companies have been established in related provinces and cities. Each production factory has also widely established applications service agencies, provided training for users, provided technical counseling, and equipment maintenance.

According to incomplete statistics, up to the end of 1980, the number of large, medium and small computers installed by every profession and trade throughout the nation had reached 3,000. These computers have served importantly in the development of our nation's science and technology, national defense construction and national economy. Since the beginning of this year, the computer industry has implemented the guideline of readjustment of the national economy, the emphasis of work turned from production and manufacturing to popularization and application. Some typical applications test point projects which are significant for popularization have been launched in the fields of energy, light textiles industry and transportation industry. Application of the computer in our nation has expanded from mainly for scientific and engineering computations and applications in the past towards data processing, business management and real time control in each of the departments of the national economy.

This computer exhibition and sales meeting sponsored by the National Computer Industry Bureau opened at the Beijing Exhibition Hall. Comrade Wang Zhen [3769 7201] officiated at the ribbon cutting ceremony. Over 200 products by more than 90 research and development units and production units throughout the nation participated in this exhibition. The exhibits were mainly applications oriented. At the same time, some new products were exhibited. According to user demands, technical lectures and technical exchange activities will also be held. The exhibit and sales activities will last for a month and a half and the exhibit will close on October 15.

Applications Stressed

Beijing GUANGMING RIBAO in Chinese 2 Sep 81 p 1

[Article by Staff Commentator: "Take Application As the Key to Exert Efforts in Developing Our Nation's Computer Industry"]

[Text] Popularization of the application of computer technology is a question that concerns the entire situation of developing our nation's computer industry. To solve this problem well will exert an important influence upon the development of the entire national economy, national defense construction and science and culture. At present, under readjustment of the national economy, the important question of developing our nation's computer industry should be to turn from the past practice of centering around the research, design and manufacture of computer hardware rapidly towards popularization and application as the key, and to use this to lead research and development, production and manufacturing, systematization of peripheral equipment, development of applications, technical service and sales of products.

Computer technology is a leading technology. The computer industry is a new industry that serves a leading function. It is an indispensable means of modernization for the technical improvement of the national economy and national defense construction and for the realization of scientific management. At present, the level of computer technology, the scale of production and the degree of application have become important signs of the development of modern productivity. It is a profession that has developed the fastest. It has also rapidly and widely penetrated each field and has brought about great changes in production, technology, management and even social life. Data shows that in modern industrially developed nations, there are over 4,000 professions that commonly utilize computer technology. Our nation is advancing towards the building of the four modernizations. If we do not realize computerization, modernization cannot be imagined. In national defense, whether for combat weapons, strategic equipment, or technical combat command and control, the computer is indispensable. In economic buildup, replacement of a massive amount of products must realize digitization, integration, intellectualization, and these all require the computer. The design, production, quality control, management reform of products all require the computer. The entire economic activity such as planning, statistics, comprehensive balancing, financial management, capital turnover are all inseparable from the computer. Therefore, in the period of readjustment of the national economy, each profession must emphasize the use of computer technology, select and use domestically produced computer systems and equipment as much as possible so that our nation's computer industry can develop quickly.

Research and development, manufacturing of products, applications services, training of personnel are the four important parts of the computer industry which cannot be separated from each other. Of these, popularization of application and technical service are a link that we have not paid much attention to in the past. We must fully recognize this point, and in readjusting the guiding ideology and industrial structure, there must be a strategic change.

According to our nation's actual situation, we should first pay attention to the popularization of small computer and microcomputer systems. Small computer and microcomputer systems are low priced, changes in the system are more versatile, they can better adapt to the changes in user demands by the users and maintenance personnel and technological developments. Therefore, they are an inexpensive technological means in the important path to realize automation in management and control. Therefore, while developing large and medium sized new series of computers, it seems very important to develop small computer and microcomputer systems that have a great demand and that have broad applications.

Emphasizing application as the key does not mean that systematization and systems functions can be neglected nor does it mean that product quality and reliability of the operating system can be neglected, nor does it mean that the ratio of performance to price can be neglected. It is exactly the opposite. To popularize application, we must tightly grasp the two weak links of software and peripheral equipment. We must develop applications software, develop a processing system for Chinese characters, continuously perfect and expand the function of the computer system, continuously improve the reliability and stability of the system. This is to establish the material foundation for application well. To improve the competitiveness of domestically produced computers and suit the level of the domestic users, it is very important to establish a policy to lower the price.

The goal of developing the computer industry is entirely for application. Only application can open up the way, and especially by strengthening technical services for the users can the sales of products be opened up. Sales is an important economic and technical activity of enterprises, it is the key upon which the life of the enterprise depends. Sales of computers and technical service are closely related. Foreign computer factories and businesses take "user service" as the most important guiding ideology of the entire business activity of the company. The best technical personnel are assigned to sales and technical services positions. Technical service personnel and product sales personnel constitute about one third of the entire personnel of the profession. Now, application of our nation's computers has gradually turned towards the various departments of the national economy. It has expanded from scientific computation to data processing and real time control. While the strength of computer technology of the various sectors of the national economy is still weak at present, the technical problems encountered in data processing and real time control are more complicated, strengthening technical service for the users is a forceful measure to open up new fields of application. We must allow about thrity percent of the technical force to carry out applications service. Research institutes, mainframe plants, peripheral equipment plants must all place applications service in an important position. We must also readjust some units that presently duplicate production to change them to units specializing in applications service according to plan. We should mobilize special technical personnel from more enterprises and research institutes towards applications service, establish regional and even national sales service networks. Each region should strive towards a three-in-one combination of research and development, production, technical service and market sales while establishing computer industry companies. We must open up a road for broad applications through technical service to lead research and development and production. Only in this way can there by vitality. The present stage of technical service cannot be too ambitious. We should start out from the easy and advance towards the difficult and from the typical to the universal. At present, we must grasp tightly the computer applications systems which are technically more mature, which require less investment, which can produce quick results, which are worth popularization in the fields of energy, light and textile industries, transportation and management so that visible economic gain can be obtained within a short period.

Popularization of the application of computers is a strong driving force in the development of computer technology and industrial development. As long as the leadership pays attention, grasps the situation tightly, the computer industry will surely enter a new stage of development under readjustment and will serve its function in the development of the national economy.

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CSO: 4008/462

BRIEFS

TECHNICAL ACHIEVEMENT AWARDS--Beijing, 13 Sep (XINHUA)--At a scientific and technological work conference which lasted from 2 to 13 September in Beijing, the First Ministry of Machine Building presented certificates and cash awards in recognition of the results of 239 research projects. There are 6 first-grade, 64 second-grade, and 169 third-grade awards. Among the results of the 239 research projects, 24 are up to or close to advanced world standards, 50 have filled gaps in China's science and technology, and 131 have attained advanced standards in the country. A striking example is a high-temperature and pressure sealed structure for ammonia-synthesis towers designed by the Hefei General Machinery Research Institute. It has been used successfully on three synthetic ammonia installations in Nanjing, Guangzhou and Anqing. Because the gas leakage problem has been solved, the three installations can produce 6,000 dun more ammonia annually. [Beijing XINHUA Domestic Service in Chinese 0750 GMT 13 Sep 81 OW]

CSO: 4008/464

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AUTHOR: WU Daihua [0702 0108 5478]

ORG: Wuhan Institute of Building Materials

TITLE: "A Simplified Method for Calculating the Two-way Reinforced Concrete Slab"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 1-6

TEXT OF ENGLISH ABSTRACT: A simplified method for calculating the two-way reinforced concrete slab is presented here. The load on the slab can be made to be distributed equally to deflect in two directions along the entire center line of the slab. This method leads to greater precision in calculating as compared with Marcus' method which is recommended in the current literature both at home and abroad and, in particular, it can reflect the elastic characteristics of the structure when applied to the wall of a rectangular water basin.

AUTHOR: ZHANG Nanlun [1728 0589 4858]

ORG: Wuhan Institute of Building Materials

TITLE: "The Membership and Probability Characteristics of Random Occurrences (II)"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 7-14

TEXT OF ENGLISH ABSTRACT: This is a continuation of the discussion on the membership and probability characteristics of random occurrences which appeared in a previous issue of this journal. Having studied these characteristics by means of a statistical method, we have found the relationship and difference between them. In addition, research has been done on the logical basis of this kind of statistical method.

AUTHOR: WANG Qihong [3769 0796 1347]

ORG: Wuhan Institute of Building Materials

TITLE: "The Stresses of Rheological Materials in Cylindrical Rigid Dies under Constant Strains"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 15-19

TEXT OF ENGLISH ABSTRACT: There exist two typical cases of the stresses and strains of rheological materials in cylindrical rigid dies. One of them, expressed as $\sigma_x = \sigma \Delta (t)$, has been discussed in a previous article. The other expression, $\varepsilon_x = \varepsilon \Delta (t)$, is discussed in the present paper.

AUTHOR: YUAN Runzhang [5913 3387 4545]
YANG Jinwei [2799 6930 0251]

ORG: Both of the Wuhan Institute of Building Materials

TITLE: "The Formation and Stability of Hydroxyl Ellestadite in Autoclaved Products of the Lime Quartz Mixture Containing Calcium Sulfate"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 20-33

TEXT OF ENGLISH ABSTRACT: The strength of lime-quartz products cured in an autoclave will decrease due to the formation of hydroxyl ellestadite (HXEL phase). Factors which may influence the formation of the HXEL phase are multiplicity, such as fineness of quartz, CaO/SiO_2 molar ratio, mixture, time and temperature for hydrothermal treatment and amount of gypsum used in the mixture, etc. However, it is considered that the most essential factor is the relative amount of Ca^{2+}, SiO_4^{-4} and SO_4^{-2} content in the solution. When the amount of gypsum is sufficient, the relative amounts of CaO and SiO_2 content in the solution are considered to be mainly responsible.

The average CaO/SiO_2 molar ratio of hydrates formed has been taken as the index for determining the formation and stability of HXEL. When the ratio exceeds 1, the HXEL phase can be formed and stabilized.

[Continuation of WUHAN JIANCAI XUEYUAN XUEBAO No 2, 1981 pp 20-33]

There are two reasons that the formation of the HXEL phase brings about a decrease in the strength of products: (1) a shortage of cementation in the HXEL phase itself, and (2) the reactivity of quartz decreases sharply with the formation of the HXEL phase.

AUTHOR: Tenson Tsutsui
et al.

ORG: None

TITLE: "On the Fixation of Tritiated Water with Cement Hydration (I)"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 34-42

TEXT OF ENGLISH ABSTRACT: Tritiated water is one of the radioactive wastes produced at atomic facilities. The chemical properties and physical behavior of tritiated water are the same as those of ordinary water and, consequently, it is not easy to separate tritium from radioactive waste water in the same way as is done in removing other radiochemical nuclides.

It is considered a practicable method to fix tritiated water by applying the cement hydration technique. Generally speaking, $3CaO \cdot 2SiO_2 \cdot 3H_2O$ and $Ca(OH)_2$ are produced during cement hydrating, which means, for example, that 25 grams of water will be consumed by 100 grams of cement. Therefore, considering this behavior, it may be expected that tritiated water will be fixed as the component of the hydrated cement structure.

Although it has already been found through simple experiments that much of the tritiated water moves out to surrounding water, tritiated water will be incorporated

[Continuation of WUHAN JIANCAI XUEYUAN XUEBAO No 2, 1981 pp 34-42]

into the hydration of Portland cement. Therefore, an attempt has been made to study the mechanism of the transfer of tritiated water fixed with cement.

This report shows the results and conditions of essential experiments in connection with the behavior of various kinds of cement during the curing period, soaking period, and the presence of gel, water and salt and alkali concentrations in surrounding water, etc.

AUTHOR: JIANG Minghui [5592 2494 1979]
LIU Qiuxia [0491 4428 7209]

ORG: Both of Wuhan Institute of Building Materials

TITLE: "A Smoothness Instrument for Plate Glass"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 43-50

TEXT OF ENGLISH ABSTRACT: Based on the principle of geometrical optics and the photoelectric effect, a smoothness instrument for plate glass has been developed with a resolving power of 4.2". The factors which may affect the accuracy of measurement are analyzed; the curre characteristics and smoothness of the plate glass in connection with different industrial processes are discussed.

AUTHOR: SHI Daxin [4258 1129 9515]
XU Jian [1776 0256]

ORG: Both of the Wuhan Institute of Building Materials

TITLE: "Markovian Process and the Randomness Model for Ore Dressing"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 51-64

TEXT OF ENGLISH ABSTRACT: With reference to previous work done by others and in view of the randomness and statistics in the movement of mineral particles in ore dressing equipment or flow paths, a hypothesis is proposed as follows: When ore dressing is kept in a state of stability, although the movement conditions for various kinds of particles in the groups of particles in wide distribution may vary, the same particles (strictly speaking, of identical size, shape and specific gravity) exist in the same environmental conditions. Thus the probability of their movement is equal. The movement of various particles can be described by the Markovian randomness process. In the present paper, a randomness model studying some technological theories in ore dressing is presented using the methods of the Markovian process in connection with time continuance, limited state and homogeneous time. Some experimental tests have been made.

AUTHOR: LI Guiqing [2621 2710 7230]
QU Weilian [4234 0251 1670]

ORG: Both of the Wuhan Institute of Building Materials

TITLE: "Static and Dynamic Calculation of the Orthotropic RC Rectangular Plate Supported on Four Angles with Edge Beams"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 65-83

TEXT OF ENGLISH ABSTRACT: The equilibrium equation and boundary conditions of orthotropic RC rectangular plates supported on four angles with edge beams are formulated. The series expression for the displacement function of the plate subjected to a static load and the frequency equation of the plate under free vibration are obtained by means of the displacement method. The results have been programmed for computers.

AUTHOR: ZHOU Wanghua [0719 2489 5478]
PI Yonglin [4122 3057 2651]

ORG: Both of Wuhan Institute of Building Materials

TITLE: "A Study on the Flexural Design Method for Composite Prestressed Concrete Beams"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 84-97

TEXT OF ENGLISH ABSTRACT: The stress of prestressing steel in composite prestressing concrete beams, because of its excess stress, can be so high as to be close to the strength of the steel when in service. This is insecure and therefore must be controlled. For the purpose of practical design a calculation method is proposed for determining the total area of steel based on the ultimate-load condition and the service-load condition. The ultimate bearing capacity of composite prestressed concrete beams is studied. It has been proved that under certain conditions the ultimate bearing capacity of composite prestressed concrete beams is greater than that of their equivalent prestressed concrete beams.

AUTHOR: HUANG Bangrong [7806 2831 2837]
WANG Fengan [3769 6265 1344]

ORG: Both of the Wuhan Institute of Building Materials

TITLE: "Research on the Cracking Resistance of the Prestressed Concrete Composite Beam with the Rectangular Section"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 98-108

TEXT OF ENGLISH ABSTRACT: The mechanical performance of the prestressed concrete composite beam with rectangular section at cracking and the effects on cracking resistance due to increasing the ultimate elongation of concrete by increasing the strain gradient at the tension zone of the section are studied. A coefficient α_D has been given for modification of the plastic coefficient ν .

The prestress loss before and after the composition of beams which may influence the cracking resistance of the composite beams is also analyzed. In addition, two methods for calculating the first crackings on the precast concrete are suggested.

AUTHOR: ZHOU Wanghua [0719 2489 5478]
PI Yonglin [4122 3057 2651]

ORG: Both of Wuhan Institute of Building Materials

TITLE: "An Experiment on the Mechanical Properties of Composite Prestressed Concrete Beams"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 109-129

TEXT OF ENGLISH ABSTRACT: This paper describes an experiment on the mechanical properties of composite prestressed concrete beams with rectangular section. An analysis is made of the test results of 15 composite prestressed concrete beams with rectangular section. It can be concluded that under suitable conditions composite prestressed concrete beams, when compared with their equivalent prestressed concrete beams, have the following characteristics: 1) stress excess of prestressed steel, 2) strain lag of added concrete, and 3) increase of strain gradient in the tensile zone of concrete when the composite section is subjected to a load. It has been proved that the stress distribution over the compressed zone of the prestressed component under constructional load, the added concrete having hardened and the composite section being subjected to the design load, would correspond to the effect of a certain prestress. The prestress is referred to as a load prestress. The effect of the mechanical properties of composite prestressed concrete beams on their behavior is also discussed.

AUTHOR: ZANG Anmin [5258 1344 3046]

ORG: Wuhan Institute of Building Materials

TITLE: "On Calculating the Transverse and Longitudinal Stiffness of a Single-story Industrial Workshop"

SOURCE: Wuhan WUHAN JIANCAI XUEYUAN XUEBAO [JOURNAL OF WUHAN INSTITUTE OF BUILDING MATERIALS] in Chinese No 2, 1981 pp 130-138

TEXT OF ENGLISH ABSTRACT: It is necessary to have good control of the stiffness of a shop equipped with a heavy or intermediate duty crane for the purpose of guaranteeing its quality, improving the working conditions and making sure that the crane will work properly. A practical and simple method is thus proposed for calculating the transverse and longitudinal stiffness of a single-story workshop. This is intended as a reference for structural designers.

9717
CSO: 4009/410

AUTHOR: None

ORG: Codes Research Department, Institute of Building Structures, Chinese Academy of Building Research*

TITLE: "A Methodology of Probability-based Limit States Design--Some Concepts on the Draft of 'Common Unified Standard for Building Structures Design' in China"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 1-18

TEXT OF ENGLISH ABSTRACT: This paper introduces briefly the methodology of probability-based limit states design, which is adopted in the draft of "Common Unified Standard for Building Structures Design" in China.

The paper emphasizes concepts of the above-mentioned method, including variability of loads effect and resistance, combination forms of loads effect, measurement of structural reliability and its probability analysis, structural target reliability indices and grades of safety, design expressions for structural members and determination of partial coefficients, as well as corresponding relations between structural reliability and quality control of structural materials and members, etc. The characteristics of the Standard are also stated briefly.

* Text of the article is by LI Mingshun [2621 2494 7311], SHAO Zhuomin [6730 0587 3046] and MA Kunzhen [7456 0981 6297].

AUTHOR: XU Guolin [1776 0948 2651]
TANG Guoying [3282 0948 5391]
DING Dajun [0002 1129 6874]
PANG Tonghe [1690 0681 0735]

ORG: XU and TANG both of the Northeast Power Plant Design Institute, Ministry of Power Industry; DING and PANG both of the Department of Civil Engineering, Nanjing Institute of Technology; Power Line Materials Factory, Power Bureau, Yunnan Province; Well Pipe Factory, Mechanized Works Company, Jiangsu Province

TITLE: "Experimental Study on Stiffness and Crack of Reinforced Concrete Ring Section Members in Bending"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 19-33

TEXT OF ENGLISH ABSTRACT: According to the test results of three series of specimens, the formulas for computing the stiffness and crack width on the section of reinforced concrete ring members subjected to bending are suggested. The comparison of the results from calculation and tests shows satisfactory agreement. The formulas suggested in the paper are simpler and their forms are similar to those of the corresponding formulas given in the current code, so it is easier to use them in practice. In addition, the authors have tried to present a statistical formula for computing the probable (at a certain level of security) maximum crack width.

AUTHOR: CHEN Yongqi [7115 3057 4359]
LIU Xihui [0491 6932 5634]
GONG Sili [7895 1835 4409]

ORG: All of the Chinese Academy of Building Research

TITLE: "The Artificial Earthquake Ground Motions Compatible with Standard Response Spectra"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 34-42

TEXT OF ENGLISH ABSTRACT: This paper addresses itself to earthquake ground motion simulation. The approach to generating artificial accelerograms presented here is based on the approximate relationship between acceleration response spectra and power spectra. By using the standard response spectrum specified in the current seismic design code for building as the target, a computer program, ASSW, is compiled. The analysis of some results is worked out in this paper and problems concerned with it are discussed, such as the influence of artificial ground motion duration on the response spectrum resulting, the time of iteration algorithm adopted in the computer program, etc.

AUTHOR: CHEN Huanqiang
et al.

ORG: None

TITLE: "Measurement and Analysis of Natural Vibration Characteristics of Column-type Structures:

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 43-55

TEXT OF ENGLISH ABSTRACT: Based on the measurement data of 96 standing column-type structures, formulas for calculating natural periods of vibration and vibration modes of these structures are presented. The formulas are derived by analyzing the measured vibration modes and using the Hamilton theorem in analytical mechanics together with the Ritz method for resolution. The results obtained from calculation are tested by the measured vibration modes of 25 such structures. The differences between them are quite small. Calculation tables for simplified work are listed in the paper.

AUTHOR: BAO Zhisun [7637 6347 1327]

ORG: Fifth Design and Research Institute

TITLE: "The Direct and Reasonable Design of Rectangular Sections of Reinforced Concrete Members Subjected to Biaxial Bending and Compression"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 56-63

TEXT OF ENGLISH ABSTRACT: The method of converting relative cover depth is proposed in this paper, thereby reducing the number of calculating parameters for reinforced concrete sections subjected to biaxial bending and compression. With the aid of the design charts included in the article, the reinforcement of these sections can be designed directly. Furthermore, suggestion for improving the formula for the strength of the section subjected to compression load with small eccentricity in the current code TJ 10-74 is also made in this paper.

AUTHOR: CHEN Haobin [7115 4110 1755]

ORG: Fujian Institute of Building Design

TITLE: "Practical Calculations of Contact Reactions for Box Foundations"

SOURCE: Beijing JIANZHU JIEGOU XUEBAO [JOURNAL OF BUILDING STRUCTURES] in Chinese No 4, 1981 pp 64-78

TEXT OF ENGLISH ABSTRACT: Based on recent research and measurement results of tall building box foundations, contact reactions and their causative factors are discussed and compared in this paper. The method of calculating contact reactions by the layers summation procedure is improved and tables compiled for practical use are included. With this, the reactions and conventional settlements can be calculated on the same basis as were the causative reaction factors. Calculated results agree fairly well with measured values. The suggested methods are also adaptable for calculating contact reactions of a rectangular box foundation on layered subsoil conditions.

9717
CSO: 4009/463

Coal Preparation

AUTHOR: ZHANG Dianzeng [1728 3013 1073]

ORG: None

TITLE: "Tapping the Potentials and Transforming the Techniques of Coal Preparation Plants"

SOURCE: Beijing MEITAN KEXUE JISHU [COAL SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 81 pp 6-11

ABSTRACT: Since the liberation, there have been great developments in China's coal washing and processing industry. There are now 105 washers with a design capacity over 10^8 tons and China now has the capability of designing, manufacturing the equipment, and establishing large coal washers. Compared with the advanced technology of the world, China remains backward in this field, however, in so far as the equipment being relatively old, the capability of floating heavy material poor, various parts of the equipment often incomplete, and results of coal selection inferior. Measures for replacing the old equipment with contemporary designs of W. Germany, Australia, the USA, Britain, France, Japan, and the USSR are detailed. The paper claims that future developments of China's coal preparation industry are, of necessity, to be in the direction of large size plants, an emphasis on floating heavy material, and further automation by adopting techniques of remote control, remote testing, computer control, and industrial television to reduce the number of workers in a 3-million-ton advanced coal washer to 300 persons.

AUTHOR: LI Zhongxin [2621 1813 0207]

ORG: Engineer, Bureau of Science and Technology, Ministry of Coal Industry

TITLE: "Ways of Reclaiming Coal From Rejects in the Coal Preparation Process"

SOURCE: Beijing MEITAN KEXUE JISHU [COAL SCIENCE AND TECHNOLOGY] in Chinese No 8, Aug 81 pp 53-54

ABSTRACT: Nationally, the heat energy utilization rate of coal is very low in China, only about 28 percent, while that of industrially developed countries is close to 50 percent. More than 70 percent of the coal distributed to the users are not prepared, hence the waste. If the washing and processing rate of coal is raised from the current low ratio to improve the quality and adjust the variety for reasonable utilization to add 10^8 tons of raw coal to the processing plants, it is estimated that 10 million tons of coal a year may be saved by the 4 large users of the metallurgical, power generating, railway, and chemical industries. The paper details the methods of reclaiming, through selection and processing, the coal used by locomotives, power generating plants, etc. Simple work processes of using non-magnetic medium to reclaim coal from gangue, coal washing waste water, etc. are introduced.

6168
CSO: 4009/470

Electronics

AUTHOR: LIU Zhenwei [0491 2182 1218]

ORG: Institute of Spacecraft System Engineering, Chinese Academy of Space Technology

TITLE: "The Element Pattern-steerable Adaptive Circular Arrays"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 137-142

TEXT OF ENGLISH ABSTRACT: In this paper the element pattern-steerable adaptive circular arrays are described. The element consists of three orthogonal dipoles. All the element radiation patterns in the array can be steered by a set of weightings to point to an arbitrary specified direction. Thus a high directional beam in an arbitrary directional position within a three-dimensional space can be formed to capture a desired signal effectively. On the above basis the techniques of the adaptive linear array of uniformly spaced isotropic elements investigated by W. F. Gabriel are generalized to the special topic of the element pattern-steerable adaptive circular arrays by means of the concept of equivalent interference source.

This paper discusses the following theoretical aspects of the said arrays: the array far-zone radiation field, the direction-controlled weighting factors of the element radiation pattern, the covariance matrix of the set of system inputs, the orthogonal resolution of the array output pattern, the transient characteristic for total output noise power of the array system.

AUTHOR: DU Shimin [6757 0013 3046]

ORG: Beijing Institute of Radio Measurement

TITLE: "The Characteristics of the Scattering Patterns from a Subreflector of a Monopulse Antenna"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 143-151

TEXT OF ENGLISH ABSTRACT: This report covers the studies of the characteristics of the scattering patterns from a subreflector of the modified monopulse dual reflector antennas. In this report, first the basic computed formulas of the far-field "sum" and "difference" scattering patterns are deduced, and then the computed and measured results of the scattering patterns for the antenna of about 60 λ diameter are obtained. By the analysis and experiment of the scattering characteristics of a subreflector of the monopulse antenna, a high "sum" efficiency and slope of secondary "difference" pattern can be obtained using optically shaped reflector approach. Finally, the measured results of the modified cassegrainian monopulse antenna are given.

AUTHOR: BIAN Peng [0593 1756]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "Recent Progress in Studies on Oxide Cathodes Using Surface Techniques"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 152-159

TEXT OF ENGLISH ABSTRACT: A review is made of recent progress in the study of oxide cathodes using surface techniques. Beginning with the careful and rather detailed studies of the thermionic properties of BaO, thus leading to the Ir-BaO cathode initiated by the NRL group, we pass over to report surface studies of the triple carbonate cathode, thereby touching on the so-called Medicus cathode.

AUTHOR: REN Yu'an [0117 5940 1344]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "One-dimensional Analysis of Heat Conduction of the Open-type Slow Wave Structure"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 160-166

TEXT OF ENGLISH ABSTRACT: In an O type high power travelling wave tube (TWT), its power capacity is determined by the heat conduction characteristics of the slow wave structure (SWS). When the open type SWS is supported by dielectric rods of trapezoid shape in the cross section, the one-dimensional equation of the temperature difference between the hot spot of the SWS and the barrel of the tube is derived in this article. The temperature difference value determines the power capacity of the TWT. The equations obtained are then applied to analyze different kinds of practical open type SWS. Theoretical calculation is in good agreement with measurement. Some values of temperature difference for several practical SWS, some of which are made by a spring pressed and some by brazing, are given for comparison and for use in technological design and analysis.

AUTHOR: YE Yulin [5509 3022 2651]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "The Electric Charge Accumulation in the Color TV Light Valve Tube"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 167-172

TEXT OF ENGLISH ABSTRACT: This paper explains the image expansion and confusion of red and blue caused by the electric charge accumulation on the oil film in the color television light valve tube.

AUTHOR: ZHAO Liping [6392 4539 1627]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "Self-sharpening Effect of Electron Beam Landing on Target in Vidicon"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 173-184

TEXT OF ENGLISH ABSTRACT: In this paper the self-sharpening effect of electron beam landing on the target in a vidicon and its influence on resolution of electron beam have been digitally analyzed with a computer. The mathematical-physical models applied are as follows: The distribution of current density in electron beam is Gaussian; the energy distribution of electrons in beam is Maxwellian; and the signal-readout model is capacitor discharge model. When the model of cross section of the beam is one-dimensional, the self-sharpening effect of the beam is 1¼" and 2/3" plumbicon, 1" Sb_2S_3 vidicon and 1" saticon is computed. In addition, their influence on AR (amplitude response) of electron beams has been computed. The influences of beam current, signal current, equivalent temperature of beam, target capacitor and velocity of scanning on the self-sharpening effect have been analyzed. When the model of the cross section of the beam is two-dimensional, the self-sharpening effect of the beam in 1¼" plumbicon is given as an example.

AUTHOR: HONG Pu [3163 3184]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "A Long Pulse Large Area Intense Electron Beam Source"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 185-190

TEXT OF ENGLISH ABSTRACT: The long pulse electron beam system reported here was constructed for transverse pumping and e-beam sustained discharge large energy gas laser. The electron beam parameters are: beam energy about 200-250 keV, pulse duration (FWHM) about 1-3 μs, current density in 0.5 - 8 A/cm^2 range and beam area 100 x 10 cm^2. With this system, we have performed XeCl laser experiments and obtained laser energy output ~1 J in 1.9 l active volume. Recently this system was used as a pumping source for a CO_2 laser, and we have preliminarily obtained 360 J laser energy in 7.85 l active volume.

AUTHOR: BAI Zhengang [4101 2182 4854]
JIANG Dingjian [3068 1353 0256]
ZHANG Honglai [1728 3163 0171]
ZENG Zhaosi [2582 2507 0203]

ORG: All of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "A High Current Density Thermionic Cathode"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 191-192

TEXT OF ENGLISH ABSTRACT: A dispenser cathode which consists of a porous body of tungsten impregnated with barium scandate has been developed. It has good properties: high emission current density, low evaporation rate, good reactivation ability after poisoning and long life. This kind of cathode is suitable for use as an electron emitter for certain high power microwave tubes, etc.

AUTHOR: LI Xianglin [2621 4382 2651]
CAO Youjiang [2580 1635 3068]

ORG: Both of the Shanghai Wire Communications Factory

TITLE: "A Simple Way to Handle the Problem of Loading with Multilayered Dielectric Sheaths Outside the Array Aperture"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 193-195

TEXT OF ENGLISH ABSTRACT: In this paper the effects of dielectric sheet on the array antenna are described based on the element cell. The formulas suitable for computer calculation are derived by use of the transmission line circuit theory. Useful results are obtained by use of computer type-719, and the correctness of the results is discussed. The theoretical data are in agreement with experimental results obtained from the waveguide simulators.

AUTHOR: JIANG Zunfu [1203 6690 1381]

ORG: Institute of Electronics, Chinese Academy of Sciences

TITLE: "An Improved Algorithm for FFT"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 3, Jul 81 pp 196-200

TEXT OF ENGLISH ABSTRACT: An improved algorithm for FFT is proposed. The Fourier transforms of a complex discrete sequence with $N = 2^{\gamma}$ points are performed by the operation of $(\gamma-3)$ N/2 times of multiplication. The speed of the algorithm is faster than the conventional FFT. The speed up ratio is about $3/(\gamma-3)$.

9717
CSO: 4009/413

AUTHOR: MA Huaxiao [7456 5478 1321]

ORG: Chengdu Plant No 65

TITLE: "The Logical Analyses of Operational Types and Probability Calculation for Reliability in Power Systems"

SOURCE: Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese No 4, 1981 pp 3-12

TEXT OF ENGLISH ABSTRACT: This paper suggests one logical expression for schematic diagram of power systems, and also an optimum expression if any limiting conditions of minimum term are not to be applied repeatedly. The logical expressions for a power system may be applied to the logical analyses of operational types of a power system, and the optimum expression through logics-probability transformations may then be applied to probability calculation for reliability of a power system. The "Theorem of Equivalent Transformations for Logics" and "Rules for Logics-Probability Transformations" in the literature are applied to analyze and calculate the probability problems in various systems of complicated constructions. Methods suggested for calculating the reliability concerning power systems by some foreign specialists are briefly discussed.

AUTHOR: WU Liefeng [0702 3525 1496]

ORG: Nanjing Automation Research Institute

TITLE: "Microcomputer-based Remote Terminal Unit and Its Application to the Control of Water Turtine Generators"

SOURCE: Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese No 4, 1981 pp 13-19

TEXT OF ENGLISH ABSTRACT: The computer distributed processing system is a configuration of higher reliability and processing efficiency in real-time control systems. Practical application of this configuration is possible since its combination with microcomputers.

The remote control unit (RTU), or unit automatic control equipment, is the backbone of a distributed processing system. It is a subsystem by which the object is directly handled and controlled. This paper describes the function of the RTU in the distributed system as well as its hardware construction and software task, and recommends its application to the control of water turbine generators.

AUTHOR: FANG Peifeng [2455 1014 6265]

ORG: Nanjing Automation Research Institute

TITLE: "The Programming for SXJ-1 Event Sequence Logging and Display Set"

SOURCE: Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese No 4, 1981 pp 20-30

TEXT OF ENGLISH ABSTRACT: SXJ-1 event sequence logging and display set, employing microprocessor as its CPU, is a new supervisory control system used in power systems in China. This paper describes the programming for this device and its main features.

AUTHOR: FANG Huiqin [2455 6540 2953]
et al.

ORG: Nanjing Automation Research Institute

TITLE: "Debugging SXJ-1 Event Sequence Logging and Display Set in Lab and in Test Run"

SOURCE: Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese No 4, 1981 pp 31-42

TEXT OF ENGLISH ABSTRACT: The SXJ-1 device is the first microcomputer-based event sequence logging and display set for an electric power system in China. This paper describes some problems encountered in debugging hardware and software by means of the development system EXORterm-200 in the laboratory and in its test run in a power plant.

AUTHOR: LU Jihuang [7120 4949 3874]

ORG: Nanjing Automation Research Institute

TITLE: "Research on the Principle of New Static Percentage Phase-comparison Busbar Protection"

SOURCE: Nanjing DIANLI XITONG ZIDONGHUA [AUTOMATION OF ELECTRIC POWER SYSTEMS] in Chinese No 4, 1981 pp 43-52

TEXT OF ENGLISH ABSTRACT: This paper introduces the principle of a new busbar protection used in HV or EHV power systems. In case of the possible reverse current during an internal fault on 1-1/2 CB busbar and other busbars, common phase-comparison busbar protection will fail to operate. This paper describes the principle of a new percentage phase-comparison busbar protection which can reliably operate in spite of the existence of reverse current.

In this paper, theoretical analysis is presented and the practical method for performing the protection is proposed.

9717
CSO: 4009/464

AUTHOR: WANG Yunda [3769 6663 6671]

ORG: Department of Mathematics, Northeast Institute of Technology

TITLE: "On Some Properties of Riemannian Space of Quasi-constant Curvature"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 1-5

EXCERPT FROM ENGLISH ABSTRACT: By a space of quasi-constant curvature we mean a Riemmanian space satisfying a certain given condition, and by a quasi-umbilical hypersurface we mean a hypersurface satisfying another given condition. The main results are given in this paper.

AUTHOR: LIANG Zhide [2733 1807 1795]
XU Jiazhen [1776 1367 2823]
WANG Fu [3769 4395]

ORG: All of the Department of Metallography, Northeast Institute of Technology

TITLE: "Three-dimensional Orientation Analysis for Cold-rolling Titanium Alloy (TA7) Sheet"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 7-15

EXCERPT FROM ENGLISH ABSTRACT: The paper is written to introduce a group of coefficients of weights b^{i}_{ln} for talculating the coefficients of ODF series w_{lmn} as shown by the given formula. An ALGOL-60 program has been written on this understanding in order to calculate the ODF for hexagonal materials and, furthermore, to determine the cold-rolling texture of TA7 titanium alloy sheet.

AUTHOR: LIANG Zhide [2733 1807 1795]
XU Jiazhen [1776 1367 2823]
WANG Fu [3769 4395]

ORG: All of the Department of Metallography, Northeast Institute of Technology

TITLE: "Charts for Interpreting the Crystallite Orientations of Both the Cubic Materials and the Hexagonal Materials"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 16-22

TEXT OF ENGLISH ABSTRACT: With the outputs of ALGOL-60 programs interpreting the crystallite orientation distributions of both the cubic materials and the hexagonal materials in terms of Euler space, this article suggests all the charts for identifying constant φ sections ($\Delta\psi = 5°$) of the ODF, and also the corresponding lists of all Euler angle values (i.e., ψ, θ, φ) of low indices ideal textures. Utilizing these charts, texture analysis of the sample becomes rather simple and intuitive. These programs are a constituent part of our library for ODF analysis.

In addition, a table is offered to demonstrate which sections of ODF are more valuable in texture analysis and which are merely intended for reference.

AUTHOR: LIN Zhaoqi [2651 5128 3823]
SUN Guijing [1327 6311 4842]
XU Haifeng [6079 3189 1496]

ORG: LIN and SUN both of the Department of Metallography, Northeast Institute of Technology; XU of the Northeastern Light Alloy Processing Plant

TITLE: "Some Problems in Development of High Strength Weldable Al-Zn-Mg Alloys"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 23-35

TEXT OF ENGLISH ABSTRACT: In this paper, the influences of the ratio Zn/Mg and the minor copper addition of the mechanical properties, weldability and SCR (stress corrosion resistance) of high strength weldable Al-Zn-Mg alloys and the selection of welding wire are discussed. The experimental results show that there exist reasonable performance indexes of strength, ductility and SCR as well as receivable weldability, while the ratio Zn/Mg of alloys and joints is equal to about 2.73. As the minor copper addition is less than 0.4 wt percent, the strength and ductility of base metal will not be substantially improved but, on the other hand, the strength and ductility (δ and α) of weld joints decrease as the amount of copper added is increased over 0.4 wt percent. The reasonable copper addition may be considered to be 0.3 wt percent for which the SCR can be greatly improved without any serious disadvantage to the weldability. The comparative tests show that the

[Continuation of DONGBEI GONGXUEYUAN No 2, 1981 pp 23-35]

welding wire $AlMg_6$ containing high magnesium is suitable for welding the high strength weldable Al-Zn-Mg alloys. If the selected welding wire is the same as the base metal, the high contents of both Mg and Zn in welding wire should be ensured and the Mn content must be restricted to a level below or equal to 0.2 wt percent.

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LIU Guolu [0491 0948 4389]
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ORG: All of the Department of Precision Alloys, Northeast Institute of Technology

TITLE: "On the Selection of Reasonable Technology to Obtain Several Kinds of Elinvar Alloys with Low Resonant-frequency Temperature Coefficient"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 37-44

EXCERPT FROM ENGLISH ABSTRACT: The effects of cold-working and aging treatment on the frequency temperature curves of some kinds of Fe-Ni based alloys (Elinvars) of low resonant-frequency temperature coefficient are dealt with in this article.

AUTHOR: SHI Yongle [2457 3057 2867]

ORG: Department of Mechanical Principles, Northeast Institute of Technology

TITLE: "An Analysis of Forms of Worm Thread"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 45-60

EXCERPTS FROM ENGLISH ABSTRACT: There are different forms of worm thread, such as Archimedes worm, involute helicoid worm, chased helicoid worm and milled worm, etc. The shorter service life of worm gearing under observation in several factories has been mainly caused by the incorrect meshing of worm and gear and, more specifically, the worm thread form usually does not match the tooth profile of the gear.

This paper offers a method to form the surface of worm thread by means of a spiral motion of the contact line on worm related to a cutter. Hence the thread surface, the form of worm thread on axial section and the pressure angle α_0 on pitch circle, etc., may be determined or calculated by some general formulas.

AUTHOR: MAO Zhonghui [3029 0022 6540]

ORG: Department of Mechanical Principles, Northeast Institute of Technology

TITLE: "A Mechanism for Precise Reappearance of Quadratrix--The Curvilinear Mechanism Useful for Dividing an Angle into Several Equal Angles as Required with Accuracy"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 61-66

TEXT OF ENGLISH ABSTRACT: The problem often comes up in engineering practice of how to equally divide an angle into several required angles. An answer to such a problem habitually used is the method of approximate calculation. In view of the fact that the accuracy of this method is insufficient, a new mechanism for the reappearance of the quadratrix (which was first put forward by Hippais, an ancient Greek Sophist) is presented in this paper. It is proved that an engle can be divided equally into three angles with accuracy by using this mechanism. The features and composition principle of the mechanism are discussed. The mechanism, designed based on a composition principle of higher pairs in a plane as shown in the figures, is a type of five-bar-and-one-gear mechanism by which a quadratrix may be plotted in a defined angular interval by the crank. As shown by the formula

$$\frac{\theta}{i} = (K-1)\frac{\pi}{2i} + \frac{\phi}{i}$$

[Continuation of DONGBEI GONGXUEYUAN No 2, 1981 pp 61-66]

the features of this mechanism can be extended efficiently to a precise task dividing an arbitrary angle into several angles as required with accuracy, where θ is an arbitrary angle, K the number of quadrants (K = 1, 2, 3 and 4), ϕ the acute angle and i the number of equal angles to be divided as required.

AUTHOR: XIAO Zeqiang [5135 3419 1730]

ORG: Northeast Institute of Technology

TITLE: "Plume Model for the Phenomena of Gas Bubble Pumping as Injecting Gas into Ladle"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 67-80

EXCERPTS FROM ENGLISH ABSTRACT: The phenomena of gas bubble pumping in the ladle stirred by gas injection was studied in this work. A plume model has been suggested to describe such a phenomenon. The plume model makes it possible to quantitatively analyze the relation between the stirring intensity and the energy supplied by gas. In such a case the buoyancy of bubbles is the cardinal force in liquid and, therefore, the initial momentum of gas flow can be considered as negligible. It follows that the momentum flux of gas-liquid flow in Z-section M should be equal to the buoyancy to bubbles. Based on the experimental determination of some parameters of the liquid flow in a 60 t ladle, a formula to determine the amount of liquid entrained by gas bubble pumping has been obtained.

AUTHOR: XU Wenpai [1776 2429 3175]
QIAN Hongjun [6929 3163 0193]
BAI Qingshun [4101 1987 7311]
ZHU Weiyong [2612 0251 0516]

ORG: All of the Northeast Institute of Technology

TITLE: "Penetration Length of a Side-blown Oxygen Jet by Immerged Lance in Molten Steel Bath"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 81-89

EXCERPT FROM ENGLISH ABSTRACT: The purpose of this article is to find a mathematical formula to express the penetration length of a side-blown oxygen jet by an immerged lance in molten steel bath in terms of the decisive criterion of similitude (Archimedes criterion) and the inclined angle of the lance.

AUTHOR: HUANG Shifang [7806 1102 5364]
JIN Guodong [6855 0948 2767]

ORG: Both of the Rock Fracturing Teaching and Research Group

TITLE: "Acoustic Emission of Rock under Penetration Fracture"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 91-100

EXCERPT FROM ENGLISH ABSTRACT: This paper is written with the aim of trying to investigate the mechanism of rock fracture by way of acoustic emission. Experiments of acoustic emission have been carried out by statically penetrating the bit into rock samples which are the marbles we adopted.

AUTHOR: Kai Grjotheim

ORG: Professor, University of Oslo, Norway, and Honorary Professor, Northeast Institute of Technology, China

TITLE: "A Comment on the Aluminum Chloride Electrolyzing Process for Making Aluminum"

SOURCE: Shenyang DONGBEI GONGXUEYUAN [JOURNAL OF NORTHEAST INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 101-108

EXCERPTS FROM ENGLISH ABSTRACT: Aluminum has been produced both by chemical and electrochemical processes. The Hall-Heroult process is, basically, an electrochemical process with some features of chemical reduction, but the Alcoa aluminum chloride process is a pure electrochemical reduction process. This paper attempts to give an introduction to and comment on the Alcoa process. In short, the practical problems encountered in developing an aluminum chloride electrolyzing process have yet to be solved and, therefore, putting it into effect on an industrial scale is time consuming. Obviously this process cannot compete with the Hall-Heroult process in the near future.

9717
CSO: 4009/414

AUTHOR: DAI Decheng [2071 1795 2052]

ORG: Nanjing Institute of Technology

TITLE: "Nonlinear Plane Vibrations in the Attitude Dynamics of Artificial Satellite"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 1-10

TEXT OF ENGLISH ABSTRACT: In this paper the defects of the research work on nonlinear plane vibrations in the attitude dynamics of the artificial satellite are pointed out. Based on the method of analysis with several rapidly rotating phases as presented in previous articles, the existence and stability of nonlinear plane vibrations are discussed with some rigor. The existence of quasi-periodic vibration in the system in nonresonant cases is shown.

AUTHOR: FAN Ming [5400 6900]

ORG: Nanjing Institute of Technology

TITLE: "Flow Chart Proposed and Theoretical Analysis on the Super-low-pressure Air Separation Plant"

SOURCEL Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 11-26

TEXT OF ENGLISH ABSTRACT: In this paper a simple and practicable flow chart for the super-low-pressure air separation plant is proposed. The electric energy consumption of the plant may be as low as 0.4 KWH per NM^3O_2; the bigger the plant, the less will be the electric energy consumption rate. Mathematical analysis of the refrigeration system and fractional distillation system of the plant provides a basis for plant design. Taking a 30,000 NM^3O_2/h plant as an example, a flow chart is designed and the theoretical number of fractional column trays is calculated.

AUTHOR: MAO Fuming [3029 4395 2494]

ORG: Nanjing Institute of Technology

TITLE: "High-efficiency Ion Source Used in Quadrupole Mass Spectrometer"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 27-31

TEXT OF ENGLISH ABSTRACT: In this paper, a design theory for focusing ions with electron space-charge is presented. The sensitivity of a mass spectrometer designed according to this theory is raised by 2~3 orders of magnitude, and the resolution is improved remarkably. This theory is also applicable to the ion sources used in other mass spectrometers.

AUTHOR: LING Yiming [5677 0001 7686]

ORG: Nanjing Institute of Technology

TITLE: "Experimental Study on Properties of Ar^+ Lasers with Glass Envelopes"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 32-40

TEXT OF ENGLISH ABSTRACT: In this paper, an experimental study on several fundamental properties of Ar^+ lasers with glass envelopes and disk bore discharge tubes is reported, including the gaseous effect in the laser tube, laser power output, etc. Brief qualitative explanations are also given for the experimental results.

AUTHOR: SUN Zhongliang [1327 1813 5328]
SHEN Chuyu [3088 2806 3768]

ORG: Both of Nanjing Institute of Technology

TITLE: "94 GHz Gunn Effect Oscillator"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 41-48

TEXT OF ENGLISH ABSTRACT: This paper describes a Gunn effect oscillator using the second harmonic as its output. The second harmonic power output of the oscillator is obtained by making use of the nonlinear characteristic of a Gunn oscillation. Thus with a single Gunn diode, functions of fundamental oscillation and frequency multiplication are accomplished simultaneously.

According to this principle, a 94 GHz oscillator using 6 mm-band diode has been developed. At a fundamental frequency of 47 GHz, the power output of the oscillator at the second harmonic 94 GHz is 20 mw. This new type of oscillator has been used as a laboratory signal source as well as the local oscillator in system applications.

AUTHOR: CHEN Duxin [7115 4648 0207]
WANG Yunyi [3769 5686 0308]

ORG: Both of Nanjing Institute of Technology

TITLE: "Computer-aided Analysis of FM-AM Direct Converter in Receivers for Satellite Broadcasting"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 49-57

TEXT OF ENGLISH ABSTRACT: In this paper, a quantitative analysis for one design of a FM-AM direct converter is made with the aid of computers. Taking into consideration the effects of nonlinearity of the diode, the relation between the output of slope filter and frequency deviation, and also the formulas for calculation of differential gain and differential phase are derived. A series of computations of the above-mentioned characteristics are carried out on computers. From the results of computations, several conclusions can be drawn about the proper selection of the operating state of the converter in order to reduce distortions.

AUTHOR: DING Dajun [0002 1129 6874]

ORG: Nanjing Institute of Technology

TITLE: "Some Problems in Stiffness Calculation of Reinforced Concrete Members"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 58-68

TEXT OF ENGLISH ABSTRACT: This paper deals with three problems in the stiffness calculation of reinforced concrete members. They are: (1) the synthetic coefficient ζ for determining the average strain of concrete at the edge compressive fiber, (2) the parallel relationship between the curves of computed steel strain ε_g and measured average steel strain $\bar{\varepsilon}_g$, and (3) modification based on the parallel relationship for formula of the coefficient ψ characterizing the nonuniform distribution of steel strain along eccentrically compressive member. The reasons to take ζ as a constant under service load and its recommended value in the current Code TJ 10-74 are verified by means of the bending stress-strain curve of concrete. The author also snows that the prerequisite conditions for the stiffness formula and the values of coefficients in the Code are well coordinated.

AUTHOR: ZHAO Zhimei [6392 5347 4168]
XIE Xijun [6200 6932 0193]

ORG: Both of the Nanjing Institute of Technology

TITLE: "Study of Dynamometer for Surface Grinding"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 69-84

TEXT OF ENGLISH ABSTRACT: In this paper, formulas of bending moment, stress and deflection for a circular ring are derived. The characteristics of a circular ring used as the elastic element of a dynamometer are discussed, and it is shown that a thick ring with a larger ration of t/R should be adopted rather than a thin ring. Three dynamometers for surface grinding of the elongated octagonal-ring type of different sizes and different designs are developed. Calibrations and grinding tests show that the characteristics of an elongated octagonal ring are similar to those of a circular ring and that the double elongated octagonal-ring type dynamometer with an integral thick wall is a satisfactory design.

AUTHOR: WEN Wenyuan [3306 2429 3293]
GE Qiaoqin [5514 1564 3830]

ORG: Both of Nanjing Institute of Technology

TITLE: "Computations by the Finite Element Method for Static and Dynamic Characteristic Analyses of Machine Tool Structures (2)"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 85-95

TEXT OF ENGLISH ABSTRACT: Based on a previous paper, a study is made of the computation method using elements of various types (triangular and rectangular element) for static and dynamic characteristic analyses of machine tool structures. Relations between the types of element and the speed of convergence are analyzed. An appropriate model for thin-walled machine tool structures is investigated. At the end of this paper some proposals are made based on the results of computations.

AUTHOR: FENG Shaoxuan [7458 4801 6178]

ORG: Nanjing Institute of Technology

TITLE: "Application of the Nomograph to Construct the Basic Views of a Circle in an Oblique Plane--On Application of the Nomograph in Mechanical Drawing (1)"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 96-110

TEXT OF ENGLISH ABSTRACT: This paper discusses the application of nomographs in mechanical drawing practice to simplify the construction process and raise the working efficiency. The author suggests that, in mechanical drawing, all the constructing work using the projection transformation method can also be done by means of nomographs as an alternative. Nomographs can be designed based on equations used for projection transformation. This paper describes how to design and apply nomographs in constructing the basic views of the feature of the machine elements with oblique planes.

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ORG: All of Nanjing Institute of Technology

TITLE: "Analysis of Thermally Stimulated Current Due to the Excess Charge in Film Electret"

SOURCE: Nanjing NANJING GONGXUEYUAN XUEBAO [JOURNAL OF NANJING INSTITUTE OF TECHNOLOGY] in Chinese No 2, 1981 pp 111-119

TEXT OF ENGLISH ABSTRACT: In this paper, the mechanism of TSC (thermally stimulated current) due to the excess charge in film electret is described, and an analytical expression for the TSC is derived.

We suggest that the TSC due to the excess charge is mainly caused by the diffusion of carriers across the zero-field-intensity surface. From this point of view the quantitative relationship between TSC and the transport of carriers in the electret is established, and an explanation of the low efficiency of TSC is obtained.

Experiments designed according to the above point of view showed that the TSC experiment may be carried out without golden coating on the sample, which is a fact of vital importance for an electret film 10 μm thick.

9717
CSO: 4009/415

AUTHOR: ZHU Bolong [2612 0130 7897]
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ORG: Both of Tongji University

TITLE: "A Study of Restoring Force Characteristics of Reinforced Concrete Flexural Members with a Constant Axial Load"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 1-10

TEXT OF ENGLISH ABSTRACT: This paper describes the experimental works of restoring force characteristics of reinforced concrete flexural members with a constant axial load. Based on experimental data of 35 specimens with rectangular or hollow circular sections, a model of restoring force used in inelastic analysis for earthquake responses of building structures, chimneys and TV masts was developed.

AUTHOR: CHEN Xuechao [7115 1331 3390]
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TITLE: "The Analysis of Deformations and Stresses in Pressurized Vessel for a Nuclear Reactor"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 11-25

TEXT OF ENGLISH ABSTRACT: The pressurized vessel of a nuclear reactor consists of three parts: the top cap, the ribbed tube-plate and the shells (the external shell and the bottom shell). This paper deals with the determination of deformations and stress states of the structure under the application of mechanical forces and the temperature fields by means of the finite element (high-order element) displacement method. A comparison especially for the ribbed tube-plate has been made between the results obtained by the finite element (both the high-order element and the simple element) method and those from the experiments.

The authors have worked out the general program for computing the deformations and stresses in some composite structures. A number of computations have been made with the SIEMENS-7730 type digital computer for different structure forms, sizes

[Continuation of TONGJI DAXUE XUEBAO No 2, 1981 pp 11-25]

and boundary conditions. These results are satisfactorily compared with those from the finite element (simple element) displacement method, experiments and classical solutions. The proposed program can be widely applicable to a lot of problems, such as plates, shells, beams and masts of single-type structures and composite structures under different mechanical forces and temperature fields.

AUTHOR: FU Changsheng [2105 7022 3932]
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ORG: Both of Tongji University

TITLE: "A Preliminary Study of the Dynamic Behavior of the Soil-structure Interface"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 26-39

TEXT OF ENGLISH ABSTRACT: In most of the analyses of the soil-structure interaction problems, usually two extreme assumptions are made, i.e., the interface is so smooth that no shearing stresses could be transmitted, or it is so rough that soil and structure would be a perfect continuum. However, relative displacements on both sides of the interface will eventually take place in the process of transmitting forces.

In this paper such a case as is mentioned above is studied by introducing the so-called joint element. The primary conclusion we have arrived at is that the horizontal relative displacements have great influences only on the term corresponding to the translational modal shape in the dynamic stiffness matrix of the soil.

AUTHOR: GUAN Shilin [7070 0013 2651]
ZHANG Qinzhi [1728 3830 5347]
YAN Deyue [7346 1795 1471]
TANG Xinyi [3282 1800 7328]

ORG: All of Tongji University

TITLE: "On Random Degradation of Linear Polymer"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 40-48

TEXT OF ENGLISH ABSTRACT: During the course of random degradation of linear polymers, the number of scissions of the individual polymer chain in the system is different. In this paper, the authors treat the distribution of chain scissions by means of statistical mechanics and obtain the most probably distribution function in analytical form. Based on Mejziler's equation and aided by electronic computer data, the influences of MWD, distribution width, average degree of polymerization and average number of scissions of the initial polymer on MWD of random degradated polymer are discussed.

AUTHOR: XIONG Bingkun [3574 3521 3540]

ORG: Tongji University

TITLE: "Generalized Tellegen's Theorem for the One-port Network and Its Equivalent Network"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 49-57

TEXT OF ENGLISH ABSTRACT: In this paper the author discusses the power relationships between the one-port network and its equivalent network under any exciting sources by means of generalized Tellegen's Theorem. Two extended forms of Tellegen's Theorem and derived formulas with definite concept are obtained. At the same time, some computation rules of power relationships between the one-port network and its equivalent network previously reported by the author are once more proved simply with the results from this paper.

AUTHOR: HUANG Liede [7806 3525 1795]

ORG: Tongji University

TITLE: "The Existence and Uniqueness Theorems of the Linear and Nonlinear Hilbert Boundary Value Problems in Space"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 58-71

EXCERPT FROM ENGLISH ABSTRACT: This paper studies the linear and nonlinear Hilbert boundary value problems in space proposed by A.V. Bitsadze, who only solved the condition of the constant coefficient. The author first demonstrates that $H(\vec{\phi}, \Sigma)$ is Banach space, then uses Banach's fixed point theorem to demonstrate the existence and uniqueness of the variable coefficient solution for the linear Hilbert boundary value problem in space. At the same time he uses Schauder's fixed point theorem to demonstrate the existence of a solution for the nonlinear Hilbert boundary value problem in space, and that this solution, given the proper conditions, is also unique.

AUTHOR: SUN Zongjian [1327 1350 1696]

ORG: Tongji University

TITLE: "The Characteristics of Acousto-optic Diffraction for Plane-polarized Light"

[illegible] Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No [illegible], 1981 pp 72-78

TEXT OF ENGLISH ABSTRACT: The characteristics of acousto-optic diffraction for plane-polarized light differ from those for non-polarized light, even in isotropic materials. The difference between two elasto-optic constants, P_{11} and P_{12}, of an isotropic material makes the characteristics of a-o diffraction for acoustic longitudinal and transverse waves transmitted in it different. In this paper, the analysis and experiments for the relation between the polarized direction of incidental light and the intensity, and the polarized direction of diffracted light are presented. Fused silica, which has a larger difference between P_{11} and P_{12}, and glass ZF_6, which has a smaller difference between P_{11} and P_{12}, are tested. The results from experiments are in accordance with the analysis.

AUTHOR: WANG Jiqing [3769 1323 0615]

ORG: Tongji University

TITLE: "An Experimental Study on Sound Transmission Loss of Lightweight Panel-stud Partitions"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 79-91

TEXT OF ENGLISH ABSTRACT: The sound insulation performance of a light panel-stud partition is greatly affected by its construction details. Since the construction parameters are very complicated, it is very difficult, if not impossible, to predict them by calculation.

After a series of experimental work in our sound insulation test facility, the following results are deemed valuable for practice: (1) TL for steel stud partition is higher than that for wood stud by an average of 4 dB. It is recommended that the depth and spacing of the stud should not be less than 7 cm and 60 cm respectively. (2) Addition of the first extra leaf to a two-leaf panel partition would improve the TL by 5-6 dB, but for another extra leaf only 2-4 dB. (3) Sound deadening fiber board strips between the stud and the panel on both sides would reduce the sound bridge effect, and then an improvement of TL of 3-6 dB for the steel stud partition is achieved, with an improvement of 6-9 dB for wood stud

[Continuation of TONGJI DAXUE XUEBAO No 2, 1981 pp 79-91]

partition. (4) Acoustical fiber bat in cavity would improve the TL by 5 dB for steel stud partition, and 8 dB for wood stud partition. However, only a small improvement, approximately 2 dB per leaf, could be gained by adding an extra leaf. (5) Since the effects of the above measures are not simply additive, one should choose the propriety of construction carefully if a high TL partition is required.

AUTHOR: ZHANG Guanlun [1728 0385 0243]
FANG Yuan [2455 0337]

ORG: Both of Tongji University

TITLE: "An Analysis of How the Composite Aluminate Type Accelerator Affects the Behavior of the Hydration of Portland Cement"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 92-101

TEXT OF ENGLISH ABSTRACT: This article deals with the accelerating mechanism of the Composite Aluminate Type Accelerator when it is added to portland cement.

In the presence of $NaAlO_2$, the $Al_2(SO_4)_3$ and other electrolytes in the cement-accelerator-water system electrolyze and react rapidly with Al_2O_3, $Ca(OH)_2$ and other chemical components to form micro needle granular ettringite and an intermediate product, secondary gypsum. These new crystals bridge the cement particles and cross-link each other to form a crystalline network, and thus the portland cement sets quickly.

This article also discusses the effect of the accelerator on the strength development of hardened cement.

AUTHOR: SUN Yeyang [1327 2814 2799]
YU Andong [0151 1344 2639]
JIANG Lusun [5592 7120 3932]
et al.

ORG: All of Tongji University

TITLE: "Earthquake Responses of Shanghai Guest Hotel by Use of the Combined Member-Story Model"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 102-112

TEXT OF ENGLISH ABSTRACT: Some attainments have been achieved in the research work of earthquake responses of tall buildings by use of the method of direct integration in recent years in China. The combined member-story model analyzing inelastic earthquake response of tall buildings is presented and the corresponding program is worked out by the authors. Based on the combined member-story model, the internal forces and deformations of each member at arbitrary time, including the maximum values of the above data within the history of earthquake response, can be obtained under consideration of frame-shear wall interaction. The application of this method to the earthquake response in the design of the Shanghai Guest Hotel is described in this paper. The hotel is 27 stories high and is being constructed. It is one of the primary attempts to apply the method of time history

[Continuation of TONGJI DAXUE XUEBAO No 2, 1981 pp 102-112]

analysis to practical design of tall buildings in China. The dynamic analysis shows that there are some advantages of the method of direct integration by comparison with the current aseismic code of China, and that the combined member-story model is more beneficial than is the story model for practical design.

AUTHOR: ZHANG Xiuyun [1728 1485 0061]
HUANG Xueming [7806 1331 2494]

ORG: Both of Tongji University

TITLE: "Poultry Houses and Their Environment"

SOURCE: Shanghai TONGJI DAXUE XUEBAO [JOURNAL OF TUNG-CHI UNIVERSITY] in Chinese No 2, 1981 pp 113-121

TEXT OF ENGLISH ABSTRACT: The modern poultry production creates optimum environment for the growth of chickens. According to the climate conditions of China, this article proposes dividing poultry houses into several climatic zones and improving the structure of the poultry houses so that the temperature in the houses meets the requirements of the chickens.

9717
CSO: 4009/403

AUTHOR: HE Guangqian [0149 1639 0051]
ZHANG Weiyue [1728 4850 1471]

ORG: Both of the Chinese Academy of Building Research

TITLE: "Analysis of Plates and Shells by the Semi-analytical and Semi-discretizing Method"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 129-140

TEXT OF ENGLISH ABSTRACT: In this paper a semi-analytical and semi-discretizing method for the moment theory analysis of elastic plates and shells is presented. Analytic solutions will first be derived which satisfy the relevant fundamental differential equations for all points within the boundaries of the plates and shells and various boundary conditions can be satisfied at suitably chosen discrete points of the boundary by the collocation method. The present method of analysis covers the solution of plates, elliptic paraboloidal shallow shells with unequal radii of curvature, cylindrical shells, shallow spherical shells as well as hyperbolic paraboloidal shallow shells. Numerical solutions for five different examples are also given in this paper. By the present method, the resulting matrix equation can be very easily formed and is of much lower order and takes less computer time. The final results can meet the precision deemed necessary for the design of plates and shells. In addition, it offers a better understanding of the features of the

[Continuation of GUTI LIXUE XUEBAO No 2, 1981 pp 129-140]

analytic solution as well as a good insight into the distribution of the internal stresses and deformations of the plates and shells.

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ORG: Zhejiang University

TITLE: "The Finite Element Method for Thin-walled Elastic Curved Beams"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 141-157

TEXT OF ENGLISH ABSTRACT: In this paper, the stiffness matrices of thin-walled elastic curved beams of open and closed sections are given by the displacement method. The polynomial approach is chosen for the displacement model and the effect of temperature is considered. As for the thin-walled elastic curved beams of closed section, the author adopts the well-known Ullmanski's hypothesis. The linear element of the cross section has been utilized by the author to discuss the discrete computation of Saint Venant's torsional function in accordance with the rule of linear distributional approach. The author also presents an analysis different from Fujita-Yoshinobu's work.

AUTHOR: LI Kaitai [2621 7030 3141]
YUAN Jiaxiang [5913 1367 7534]

ORG: Both of Xi'an Jiaotong University

TITLE: "A Finite Element Analysis Based on the Modern Engineering Beam Theory"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 159-171

TEXT OF ENGLISH ABSTRACT: The finite element analysis based on the modern engineering beam theory is a simplified finite element method applied to the overall analysis of beam structures. The distinction of this method is that it reduces the elastic structure problem of thin-walled or thick-walled beams from the solution of a three-dimensional to simultaneous solutions of a two-dimensional and a one-dimensional system, and thus it largely economizes the capacity and time for computation. Since use of this computing system for static and dynamic analysis may be carried out effectually and economically, it is suitable for frequent use.

The paper describes the basic principle of this finite element method and recommends its application to the deformation analysis of heavy machine tool beam structure. The paper also expounds the authors' views on the basic principle of the method for dealing with the stiffening ribs in a beam.

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ORG: DING and XU both of Zhejiang University; CHEN of Zhejiang Institute of Computational Techniques

TITLE: "Improvement of a Method for Establishing the Refined Element Stiffness Matrix"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 172-178

TEXT OF ENGLISH ABSTRACT: A scheme for improving the method of formulation of the refined element stiffness matrix developed by Desai and Abel is proposed. The first step of the scheme is to find the shape function, then express the strain by a complete polynomial of low degree and finally the stiffness matrix will be given in the partitioned form. A plate element with 18 degrees of freedom is taken as an example to illustrate the realization of the scheme.

AUTHOR: SONG Tianxia [1345 1131 7209]

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TITLE: "Optimal Analysis of the Composite Structure with Double Cylindrical Shells"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 179-188

TEXT OF ENGLISH ABSTRACT: A fruitful unconstrained optimization analysis of the composite structure with double cylindrical shells mentioned in previous articles has been made. In the course of optimization, not only is the hybrid penalty function induced, but a new interpolation for solving one-dimensional optimization problems is also developed.

The computer program proposed is applicable to the optimal analysis of ordinary structures.

AUTHOR: WANG Lei [3769 4320]

ORG: Hunan University

TITLE: "Finite Strip Method of Sine Series and Polynomial"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 189-203

TEXT OF ENGLISH ABSTRACT: The sine series and polynomial are used as the basic function of the ends of a finite strip. The simply supported, clamped or free (including elastic supported and elastic slope supported) ends can all form orthogonal system of triangular series. Thus the phenomenon that coupling occurs in all conditions except when the ends are simply supported is avoided. The application of the finite strip method is widened by using this method and the total stiffness matrix is made to appear as a band matrix.

AUTHOR: ZHANG Dechang [1728 1795 2490]

ORG: Northwestern Polytechnical University

TITLE: "On the Conditions of Instability for Distributed Parameter Systems with Time Lag"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 204-207

TEXT OF ENGLISH ABSTRACT: In this paper Chetaev's theorem of instability is extended to include distributed parameter systems with time lag, and the sufficient conditions of instability are discussed. The method used here is inspired by Razmukhin and has been used by the author in his investigation of instability for ordinary systems with delay. The application of the results obtained is illustrated with an example.

AUTHOR: YE Yugong [5509 5940 1872]

ORG: Institute of Mechanics, Chinese Academy of Sciences

TITLE: "The Response of Ring-stiffened Elastic Cylindrical Shell of Infinite Length to a Transverse Shock Wave"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 208-222

TEXT OF ENGLISH ABSTRACT: This method employs a simple, unstiffened uniform circular cylindrical shell as a "reference structure" and treats the ring stiffeners as "external" loadings on the uniform shell.

Based on the assumption of small perturbation, the coupled effect between the fluid and shell is considered. The real external loading on the shell is the sum of the pressure of the incident shock wave and the scattered waves. In order to avoid the difficulty in the direct inversion of the Laplace transformation, the "residual potential" method is used. The elastic response of the shell is obtained by a series in terms of all normal modes of oscillation of the structure, including both the non-extensional and extensional effects in all modes.

Calculation was made for two groups of data and curves were drawn from the calculated results, from which some useful conclusions can be reached. The equations derived in this paper can be reduced to be identical with some equations published by others.

AUTHOR: HUANG Yushan [7806 3768 3790]
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ORG: All of Northwestern Polytechnical University

TITLE: "Overload Retardation Models of Fatigue Crack Growth"

SOURCE: Wuhan GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1981 pp 257-268

TEXT OF ENGLISH ABSTRACT: In this paper eight overload retardation models of fatigue crack growth are reviewed. Their basic principles are treated and physical concepts are explained in detail.

A comparison has been made among the eight models with respect to the retardation mechanism, performance and ability to explain a variety of retardation phenomena. It is the authors' view that the Wheeler model can be conveniently used and the Matsuoka model has a clear physical meaning. Comments on the application of the retardation models to the estimation of the fatigue crack propagation life and the research on the retardation phenomena are also made.

9717
CSO: 4009/412

AUTHOR: QIN Xue [4440 1331]

ORG: None

TITLE: "New Trend in Industrial Control--the Central Dispersed Comprehensive Control System"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 7, 81 pp 14-15

ABSTRACT: Currently, the various control systems in China basically belong to the central control type, i.e. all the instruments of regulation, meters of indication and recording, switches, buttons, and keyboards of the operating processes are installed in the central control room. On the work sites, only transforming and executing devices are installed. In some plants, computers have also been adopted. Although most of the needs for automated production are met, the system has its shortcomings. For example, all test data must be sent to the central control room before they are sent to each executing instrument as control signals in an analog form. In this manner, the control circuits may be several tens to hundreds meters in length. There may easily be interference and noise to reduce the reliability of the control signals. Every little problem in the central control may also cause the entire plant to be out of function. In view of these and other problems and

[continuation of YIQI YU WEILAI No 7, 81 pp 14-15]

with the breakthrough in large scale integrated circuits, single chip microprocessors appeared in the 70's to create the condition for the central distribution type of control system. With a few microprocessors, there may be centralized information processing and dispersed control capabilities. The various on site, local control devices are linked with the central control room by a data communication cable, the information highway, sometimes measuring as long as 4.5 km. The operator, at the CRT display station,uses various selected standard software packages, modules,to carry out control functions in a question and answer form. Even those who have no knowledge of computer science can be operators. This central distributed type of automation is still new but it has already been extensively applied in foreign countries. With further improvement and perfection, it is expected to become suitable for the industrial production control of medium and small plants in the not very distant future.

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ZHU Huanyi [2612 2255 0034]

ORG: None

TITLE: "News in Instrumentation"

SOURCE: Beijing YIQI YU WEILAI [INSTRUMENTATION AND FUTURE] in Chinese No 7, 81 p 19

ABSTRACT: This paper contains the following 5 short items: (1) Microprocessor controlled plotter: A highly automatic equipment for making graphics, the HT-129M microprocessor controlled plotter has been made by the Xian Instrument Plant. It has been approved for small batch production. (2) Microcomputer learning machine: Based upon the FT-3400 learning machine of the USA, the Xian Instrument Plant and the Microcomputer Application Research Institute of Hefei Industrial University have made, through joint research, the microcomputer learning machine. It is made up of such components as a cassette taperecorder, an EPROM accessory box, a test board, a singal source output, etc. and is suitable for teaching mathematical logic, microcomputers, etc. in schools of higher education as well as for small scale research work. (3) Switch type DC/AC high voltage transducer. It is made by the Research Institute of Sonics Chinese Academy of Sciences to provide for the needs of DC current of special sonic devices of ships. It is of course also suitable

[continuation of YIQU YU WEILAI No 7, 81 p 19]

for DC current supply of automobiles, tractors, etc. (4) Spring earth pressure gauge: The YCX-21 spring earth pressure gauge, suitable for testing the pressure of various foundations has been successfully made through joint research by Shanghai Industrial Automation Instrument Research Institute and the Navigation Engineering Bureau Scientific Research Institute of the Ministry of Transportation. It has characteristics of continuous frequency output, stable zero point, small temperature discrepancy, and high reliability. It may be used for long term monitoring of the load condition of such permanent structures as dams, coal mine pits, underground tunnels, railway beds, harbor wharves, skyscrapers, etc. It has been certified and will be manufactured by Shanghai Automation Instrument Plant No 4 and Tianjin Construction Instrument Plant. (5) Enzyme labelled quantitative testing instrument: The 80-1 enzyme labelled quantitative test instrument is successfully made by Shanghai Biochemical Research Institute Chinese Academy of Sciences. It is a modernized analyzer for medical use. It is suitable for analysis and diagnosis of serum pathogens.

6168
CSO: 4009/474

AUTHOR: SONG Chongsen [1345 1504 2773]

ORG: Ironmaking Works, Wuhan Iron and Steel Company

TITLE: "A Discussion of Top and Bottom Regulations in Blast Furnace Operation"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 1-6

TEXT OF ENGLISH ABSTRACT: The main goal of top and bottom regulations in blast furnace operation is to gain control of the burden movement and ensure a rational distribution of gas flow in the furnace. The main problem is to maintain an optimal blowing condition in order to create a proper distribution of gas flow beginning from the hearth. Process regulation in the upper part of the furnace is also necessary to ensure correct gas flow distribution along the height and across the furnace.

The optimal blowing condition has been studied, making use of the "combustion intensity at tuyere" concept, in which more furnace configuration parameters are included than were in the past. Thus, a new method is provided to develop furnaces with larger diameters and lower shafts, with more and smaller tuyeres, and to establish the relationship between proper blowing and configuration parameters of the furnace.

AUTHOR: LIU Yuncai [0491 0061 1752]

ORG: Shoudu Iron and Steel Company

TITLE: "Bulk Quantity Coal Injection in Blast Furnace Practice"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 7-11

TEXT OF ENGLISH ABSTRACT: In practical operation of the No 1 blast furnace (576 m^3) of Shoudu Iron and Steel Company, bulk quantities of coal powder were injected under conditions of oxygen-enriched (4-5 percent) blast with a temperature above 1100°C. When the average injection rate of coal powder was up to 45.2 percent (or 279 kg coal powder per metric ton of iron), the heat value was still fully utilized.

This paper discusses the fact that the main role of the coal powder is to replace tuyere coke and that operating conditions of bulk quantity coal injection practice can prolong the melting period and improve obviously the utilization of gas energy. Low ash and low volatile coal is suggested when bulk quantity coal injection is applied.

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LIN Gongwen [2651 0501 2429]
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ORG: All of the Central Iron and Steel Research Institute, Ministry of Metallurgical Industry

TITLE: "The Fractional Melting Phenomenon of Mold Powders for Continuous Casting during the Heating Process"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 12-16

TEXT OF ENGLISH ABSTRACT: In this paper it has been proved that mold powder mixtures for continuous casting show a fractional melting phenomenon during the heating process, and a method is put forward to judge the fractional melting tendency of mold powders for continuous casting. The tendency of fractional melting for different mold powders is different. Mold powders with higher fractional melting tendencies result in worse slab surfaces.

AUTHOR: SHANG Shinan [0794 0013 0589]
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ORG: Both of the Anshan Institute of Iron and Steel Technology

TITLE: "A Study of the Aerodynamics of Oxygen Roof Lance for Open-hearth Furnaces"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 17-24

TEXT OF ENGLISH ABSTRACT: Through laboratory study and practical measurement in oxygen roof lance practice of the open-hearth furnace, this paper gives a general description of the basic laws governing the flowing of oxygen in the cylindrical nozzle. The author also has derived a formula for calculating the flow rate similar to that for calculating the flow rate in the Laval nozzle, thus simplifying the calculation of the design of the lance cylindrical nozzle.

The oxygen jet from the cylindrical nozzle has strong shock waves, which make the jet stagnation pressure attenuate abruptly in the direction of the axis. To eliminate the strong shock waves in the jet, a kind of supersonic nozzle, the cylindrical-divergent nozzle, has been worked out in the course of the experiments. It is easy to fabricate this supersonic nozzle. This nozzle has been proved, by actual measurements, to be similar to the Laval nozzle as far as the characteristics of the oxygen jet are concerned. A brief introduction is also given to the performance and design of the nozzle in the paper.

AUTHOR: XU Shouguo [1776 1343 0948]

ORG: Northeast Institute of Heavy Machinery

TITLE: "The Study of the Parameters of Axial Adjustment for a 20-High Rolling Mill"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 25-30

TEXT OF ENGLISH ABSTRACT: In employing 20-high rolling mill to roll steel strips and extra-thin strips, it is necessary to adjust the roll profile to get a quality product with uniform gauge and good shapes. In general, the methods of roll adjustment are of two kinds: radial adjustment and axial adjustment. This paper deals with the research on axial adjustment, the relationship between the requirements for axial adjustment and its related parameters in the process of rolling. According to the theoretical analysis and experimental study, the results obtained are as follows: take the intermediate rolls with tapered ends of the first series as the axial adjustment roll, in the process of rolling, under the condition of non-total friction of rest (only under this condition). It is practical to make the roll move along the axial direction, to get the roll profile changed, and then achieve the axial adjustment under a load, and determine as well the relationship between the speed of axial adjustment and the parameters of axial force, radial force and rolling speed, etc.

AUTHOR: WANG Tingpu [3769 1694 3292]

ORG: Northeast Institute of Technology

TITLE: "Theoretical Formulas for Calculating the Maximum Reduction in the Case of Sheet Rolling Between Rolls of Unequal Diameter"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 31-35

TEXT OF ENGLISH ABSTRACT: In this article theoretical formulas for calculating the maximum reduction in the case of sheet rolling between rolls of unequal diameter with or without tension are derived from the principle of energy conservation. The results calculated from these formulas are similar to the maximum reduction determined from the condition of nip angle, and are essentially consistent with the experimental results. When the diameters of two work rolls are equal to each other, these formulas then become the same as those derived from maximum nip angle in the commonly symmetrical rolling process. It is evident from these formulas as well as the experiments that the difference between front tension (σ_1) and back tension (σ_0) has a strong influence on the maximum reduction (Δh_{max}). When $\sigma_0 > \sigma_1$, Δh_{max} is decreased, whereas greater front tension ($\sigma_1 > \sigma_0$) will make Δh_{max} greatly increased. Consequently, in order to increase the maximum reduction in the unsymmetrical rolling process, a high enough front tension must be applied.

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ORG: LI of the Design Institute of Anshan Iron and Steel Company; GE of the Automation Research Institute, Anshan Iron and Steel Company

TITLE: "The Relationship between Acceleration and the Control of Final Temperature of Hot Strip Mill"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 36-41

TEXT OF ENGLISH ABSTRACT: The accelerative rolling schedule has been applied to the modern hot strip mill in order to keep a constant final temperature of the hot strip and improve the mill yield. All modern hot strip mills are equipped with accelerative devices with maximum acceleration of 0.5 - 1.0 m/sec^2 and minimum acceleration of 0-0.25 m/sec^2. It has been proved that lower acceleration is even more useful. In order to keep a constant final rolling temperature the mill must operate with acceleration in the range of 0.05 - 0.125 m/sec^2, thus successfully making the final thickness of the strip more uniform in the whole length.

This paper discusses the method of determining the lower acceleration rate and solves the problem of how to eliminate the temperature difference between the leading and tail of the strip with lower acceleration. When the old mill is remodeled, recommendations should be made for utilizing limited acceleration in order to obtain approximately constant final rolling temperature of the strip.

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ORG: ZHONG and GAO both of the Central Iron and Steel Research Institute; ZHAO of Daye Steel Works; QIU and SONG both of Luoyang Research Institute of Bearings

TITLE: "The Dependence of Bearing Life on the Quality of Bearing Steels"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 42-48

TEXT OF ENGLISH ABSTRACT: Bearing steels melted by five different processes, i.e., ESR, EBR, VAR, VIM-ESR and ESR-VAR, are compared in order to improve the quality and fatigue life of airborne bearings.

Based on the results of the analysis of ingot sections, conventional material testing, test of fatigue life performed on actual bearings, observation of fatigue fracture of broken bearings, the relationship between melting process, metallurgical quality and fatigue life of bearings has been discussed. It is concluded that inclusions are the main metallurgical factors affecting the life of bearings, especially the brittle oxides which have the most detrimental effect on fatigue

[Continuation of GANGTIE No 6, 1981 pp 42-48]

life. However, sulfides or oxides enveloped by sulfides have no detrimental effect on fatigue life. The amount of oxide inclusions and Al_2O_3 can be decreased by vacuum melting. Therefore, application of vacuum melting is one of the important measures for improving the fatigue life of bearing steels.

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ORG: Beijing University of Iron and Steel Technology

TITLE: "Study of the Quality of Electroslag Casting and the Surface Forming Rules"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 6, 1981 pp 49-56

TEXT OF ENGLISH ABSTRACT: This paper describes the qualities, properties, service life, metal yield as well as cost and other technical characteristics of shaped electroslag casting--guide-wheel shafts and cross rolls. In comparing the test results, ESC is equivalent or superior to forged parts. Production practice in the last three years has also proved that the ESC direct forming process in which refining and casting are combined with forming is an important method for producing some billets of machine parts by casting instead of forging. Test results show that the improvement in interior qualities of ESC is mainly due to steel-slag refining reaction and longitudinal solidification by intensive cooling. The more complex the shape of ESC, the more difficult to get good surface forming. In this paper, factors and rules affecting surface forming are studied, and it is shown that the power value of specific volume of slag pool p_V is the main factor influencing the furnace temperature and surface forming. By statistics, the approximate relation between p_V and casting radius r is obtained, i.e., $1/p_V = 3(r-2)$.

9717
CSO: 4009/408

AUTHOR: LI Guoping [2621 0948 1627]

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TITLE: "Non-equilibrium Steady State in Three-energy-level Laser System"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 7, Jul 81 pp 1-3

TEXT OF ENGLISH ABSTRACT: Taking energy and entropy as the main parameters, the changing process and dissipative properties of a laser system both with and without outside influence are considered. With the help of the principle of minimum entropy production, we introduce the phenomenological linear law to explain quantitatively the relations among the stimulated radiation, the stimulated absorption and the photon number density inside the cavity and to seek the thermodynamic criterion of the steady state of a laser under entropy and energy flux exchange with the environment.

AUTHOR: LEI Shizhan [7191 0099 3277]
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TITLE: "Influence of Gas Lens-like Effect on Mode-locking of TEA CO_2 Lasers"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 7, Jul 81 pp 7-10

TEXT OF ENGLISH ABSTRACT: The change of longitudinal frequency spacing produced by gas lens-like effect has been calculated and mode-locking induced by this change is discussed. To make gas flow or to add more He gas into the mixture so as to reduce the lens-like effect, it is possible to obtain mode-locked narrower pulses. Using proper laser resonator configuration, mode-locking stability can also be improved.

AUTHOR: GUAN Tieliang [7070 6993 2733]
HE Yuquan [0149 6877 3123]

ORG: Both of the Southwest Research Institute of Applied Magnetics

TITLE: "Magneto-optic Isolator for Optical Fiber Transmission"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 7, Jul 81 pp 11-14

TEXT OF ENGLISH ABSTRACT: The investigation of a magneto-optic isolator for fiber communication is reported. The isolator consists of a Faraday rotator made of rare-earth iron-garnet single crystal and two calcite prisms. Insertion loss of 2.4 db and isolation ratio of 34.8 db were obtained at 1.15 μm wavelength. The improvement of isolator properties by using some rare-earth substituted iron-garnets and polarization-independent techniques are also discussed.

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ORG: ZHAO of the Shanghai Institute of Laser Technology; MEI of the Shanghai Institute of Ship Research

TITLE: "Double Speckle Interferometry"

SOURCE: Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 8 No 7, Jul 81 pp 25-27

TEXT OF ENGLISH ABSTRACT: In the paper, we analyze the disturbance of out-of-plane displacement on in-plane displacement and suggest a new experimental method, "double speckle interferometry," to separate the displacement mentioned above.

9717
CSO: 4009/476

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ORG: Shanghai Machine Tool Plant

TITLE: "Quickly Improving the Ability of Chinese Make Machine Tools to Compete on the International Market"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 6, 81 pp 2, 34

ABSTRACT: This paper carries a subtitle of "Some Personal Feelings After Visiting the Chicago International Exhibit of Machines." The author visited the 1980 biennial exhibit of 900 participating machine tool manufacturers of 30 countries of the world. Machine tools made in India, South Korea, and even the Chinese province of Taiwan may be found, but not those made in the continental China. In a booth set up by a intermediary commercial company of the USA, some milling machines and laths looked very familiar to the author, however, and he knew they were products of China, without doubt. The names of Chinese manufacturers were covered by the name of a foreign company, on these machines. From a foundation of nothing, the machine tool industry of China has developed in leaps and bounds in the past 3 decades, with a production volume now ranking among the first few in the world, but the export volume is only one-thousandth of the world market. So far, Chinese machine tools have been made mainly to supply the needs of domestic economic construction. Aside from design and quality, in order to occupy a proper place in the world market, the paper suggests

[continuation of JIXIE ZHIZAO No 6, 81 pp 2, 34]

that (1) Market surveys should be carried out so that safety regulations and technical standards of various countries as well as their needs for various types of machine tools may be understood; (2) Attention should be given to the quality of advertisement; (3) The work of customer relations should be strengthened; (4) More attention should be given to customer service, such as maintaining a file of supply, repair, and maintenance conditions, helping customers installing, testing, or even training operators and repair technicians.

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ORG: All of Shanghai Machine Tool Plant No 2

TITLE: "The T6920 Ultraheavy Boring-Milling Machine With Easy Numeric Control of Positioning"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 6, 81 pp 3-4

ABSTRACT: The T6920 ultraheavy boring-milling machine, designed and made by Shanghai Machine Tool Plant No 2, has been officially operated by Shanghai Steam Turbine Plant since Dec 79 to process large parts with satisfactory results. The machine measures, externally, 20700 x 7930 x 10100mm and weighs 220t. The diameter of the major axle is ϕ200mm and that of the milling axle is ϕ320mm. The major axle rotates at a speed of 1.5-400r/min. The machine has 2 position control coordinates and one coordinate for simultaneous control. The driving component consists of an ordinary Z_2DC motor of silicon controlled stepless variable speed. The machine still has problems with respect to sealing of the guide track, designing of the cover, etc. Moreover, it has not been long since it was placed in operation. Its true industrial and practical value remains to be assessed in the future.

AUTHOR: None

ORG: Shanghai Machine Tool Plant No 8; Department of Business Administration, Shanghai Machine Tool Company

TITLE: "The D7125 Electri Spark Forming Machine"

SOURCE: Shanghai JIXIE ZHIZAO [MACHINERY] in Chinese No 6, 81 p 48, front cover

ABSTRACT: The D7125 electric spark forming machine is a recently successfully tested new product of the Shanghai Machine Tool Plant No 8. It was certified in Dec 80 by a conference organized by Shanghai Municipal Machine Tool Company and composed of representatives of related research institutes, special colleges, and factories. The machine is small, reliable, and highly automated. Its major indices are comparable to the advanced levels of similar domestic and foreign products. It is suitable for machining molds or holes of complex shapes or cavities. The major characteristics and specifications of the machine are described. A photo of the machine is on the front cover of this issue.

6248
CSO: 4009/471

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ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences, Beijing

TITLE: "The Separation of Technetium from Acidic High Level Radioactive Liquid Waste by the Use of Extraction Resin Carrying Tetraamine 7402"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 3 No 3, Aug 81 pp 141-148

TEXT OF ENGLISH ABSTRACT: The separation and recovery of technetium from acidic high-level radioactive liquid waste after denitration by formic acid has been studied using extraction resin carrying tetraamine 7402, which was prepared by means of suspension polymerization at 80°C of styrene crosslinked with divinyl benzene in the presence of 7402 extractant.

The feed, a simulated solution of high level liquid waste from reprocessing of spent fuel, was passed through the column after it had been denitrated by formic acid to a pH value of 2. By means of partial adsorption of technetium on the extraction resin and eluting with nitric acid, decontamination factor from γ-fission element, Ru, Cs and Ce of 1×10^5, $\geqslant 2 \times 10^5$, $\geqslant 1 \times 10^5$ respectively, could be obtained after two cycles of operation, and technetium could be recovered quantitatively.

[Continuation of HE HUAXUE YU FANGSHE HUAXUE Vol 3 No 3, Aug 81 pp 141-148]

The method is simple and easy to operate, and the use of precious Ag-metal can be avoided. The use of extraction resin instead of liquid-liquid extraction also eliminated production of organic liquid waste in the process, thus simplifying waste treatment.

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ORG: All of the Institute of Atomic Energy, Chinese Academy of Sciences, Beijing

TITLE: "Separation and Determination of Rare Earth Elements in Fission Products by Pressurized Cation Exchange Chromatography"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 3 No 3, Aug 81 pp 155-161

TEXT OF ENGLISH ABSTRACT: In the separation of rare earth elements with α HIBA-cation exchange chromatography, two gradient elution techniques, pH-gradient or concentration gradient, are usually used. It is considered that the two gradients are in fact both concentration gradients of α HIBA anion. For routine analysis a simple gradient device is preferred which consists of two identical cylindrical vessels and operates under nitrogen pressure. The mixing vessel contains 150 ml of 0.75 M HIBA solution at pH 2.50, and the reservoir vessel, 150 ml of 0.50 M α HIBA solution at pH 4.50. A stainless steel column (ϕ 4 x 500 mm) was filled with 2 x 8 cation exchange resin (20-30μm). During the elution at $80 \pm 0.5^{\circ}C$, the flow rate was adjusted to 0.7 ml/min by regulating the pressure of nitrogen. Ten rare earth elements were completely separated within seven hours without cross contamination. The recovery for each rare earth element was above 95 percent.

[Continuation of HE HUAXUE YU FANGSHE HUAXUE Vol 3 No 3, Aug 81 pp 155-161]

The effect of four solutions for initial loading of the column on the band was examined: (1) The rare earth nitrates dissolved in 0.5 M α HIBA solution at pH 3.20. (2) The solution of rare earth nitrates adjusted to pH 3.0 - 3.5 with ammonium hydroxide. (3) The rare earth hydroxides dissolved in 0.5 M α HIBA solution at pH 3.20. (4) The rare earth nitrates dissolved in dilute HNO_3 solution at pH 2.5 - 3.0. The experimental results indicated that the fourth solution for initial loading of the column is the best. Maximum rare earth concentration occurred on the top of the column, and the adsorbed band is narrower. Better results could be obtained from the first solution, but the rare earth precipitates were sometimes separated out from the solution after dissolving. Based on the above-mentioned facts, a procedure was proposed to separate and determine individual rare earth radioactive nuclides from the fission products, and good results were obtained when it was applied for determination of the fission yields of the rare earth nuclides.

AUTHOR: None

ORG: Division of Radiochemistry, Northwestern Institute of Nuclear Technology

TITLE: "The Determination of the Amount of Residual Plutonium-239 in the Nuclear Explosion Debris"

SOURCE: Beijing HE HUAXUE YU FANGSHE HUAXUE [JOURNAL OF NUCLEAR AND RADIOCHEMISTRY] in Chinese Vol 3 No 3, Aug 81 pp 173-179

TEXT OF ENGLISH ABSTRACT: The amount of residual plutonium-239 in the nuclear explosion debris was determined by mass spectrometric and alpha spectrometric analyses. The error caused by the influence of neptunium-239 on the determination of plutonium-239 was corrected by direct subtraction or linear extrapolation. A radiochemical analytical procedure was proposed and a method for storing the plutonium isotopic diluent of very low concentration (10^{-9} M) was recommended. An error less than ± 5 percent could be obtained for the direct subtraction method which is applicable only when the total yield of uranium-239 is small, and when using this method the uranium and neptunium must be separated from plutonium as early as possible. The error of the linear extrapolation is generally less than ± 4 percent, and this method is superior to the former one when the total yield of uranium-239 is large.

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CSO: 4C [illegible]9/472

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TITLE: "An Alpha Particle Thickness Gauge by Air Equivalent Method"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 4, Aug 81 pp 20-26

TEXT OF ENGLISH ABSTRACT: An α-ray thickness gauge has been designed for the purpose of measuring the thickness of ultra-thin foils ($0 \sim 4$ mg/cm^2) made of any material. The precision is better than 1.5 percent. By using the air equivalent method, it is possible to measure samples in the air to simplify the instruments used and to obtain higher precision. A semi-empirical formula for the relative mass stopping power as a function of E_α, Z and A has been derived. The divergency between the results from the formula and the data from Ziegler's table is less than 8 percent.

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TITLE: "The Fluorescence Analysis of Uranium in Phosphate Fertilizers, Soils and Plants"

SOURCE: Shanghai HE JISHU [NUCLEAR TECHNIQUES] in Chinese No 4, Aug 81 pp 53-56

TEXT OF ENGLISH ABSTRACT: Trace uranium in plants, soils and phosphate fertilizers was determined with the method of fluorescence analysis. The recovery of the procedure for 1 μg of added uranium is 74 percent. The detection limit of the fluorophotometer is 5×10^{-10} g, with a precision of 5 percent. The sensitivity of the method is 7.5×10^{-9} g for 1 g of plant ash, 6.4×10^{-9} g for 1 g of soil, and 1.2×10^{-8} g per g for 0.1 g of phosphate fertilizer. The time required for determining three parallel samples is about six hours.

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TITLE: "Neutron Diffraction Study of the Order-Disorder Transition of an Fe-Si-Al Alloy"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 30 No 7, Jul 81 pp 887-894

TEXT OF ENGLISH ABSTRACT: The degrees of LRO (long range order) and magnetic moments of the Fe atoms in an Fe-Si-Al alloy have been determined by neutron diffraction. The results indicate that after heat treatments with different cooling rates, the alloy gains different degrees of LRO, which may be regarded as the main cause giving rise to significant differences in the magnetic permeability.

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TITLE: "On the Application of Heavy Atom Information in Direct Methods--Phase Estimation of the Structure Factors in Crystals Containing Heavy Atoms"

SOURCE: Beijing WULI XUEBAO [ACTA PHYSICA SINICA] in Chinese Vol 30 No 7, Jul 81 pp 916-920

TEXT OF ENGLISH ABSTRACT: Information drawn from the heavy atom plays an important role in the determination of crystal structures containing heavy atoms. To what extent the determination will proceed successfully depends on how the heavy atom information is used. In this paper a new procedure is proposed to make full use of the heavy atom information and make the combination between the heavy atom method and the direct method more efficient.

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